

**Summary of Research
for RXTE Guest Observer Grant NNG 04GB13G
“Simultaneous Multiwavelength Monitoring of 3C66A”**

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The radio-selected BL Lac object 3C66A was the target of an intensive multiwavelength campaign from Sept. 2003 through Feb. 2004. It was monitored by the Whole Earth Blazar Telescope (WEBT) collaboration, in tandem with 20 X-ray monitoring observations by the Rossi X-Ray Timing Explorer (RXTE), VHE gamma-ray observations by STACEE and VERITAS, and long-term monitoring at radio frequencies. In addition, 9 observations using the VLBA are being carried out during the campaign and throughout the year 2004 to follow possible structural changes of the source. 21 pointings with RXTE during the period Sept. 15 - Dec. 27, 2003. All collected data have been fully analyzed, and first results have already been published at the 8th HEAD Meeting in New Orleans, LA, in Sept. 2004, and will also be presented at the 205th AAS Meeting in San Diego, CA, in Jan. 2005. A first Journal paper, to be submitted to the *Astrophysical Journal*, is currently in preparation, and we plan to have it ready for submission in January 2005.

A gradual brightening of the source over the course of the campaign was observed at all optical frequencies, culminating in a very bright flare at the end of January 2004. Optical light curves indicate intraday microvariability on time scales down to about 1.3 hours. No significant color-magnitude correlation for the entire data set was evident, but there is a slight indication of a gradual spectral softening in the optical over the entire duration of multi-day outbursts (in both the rising and decaying phase). The X-ray spectrum is consistent with a power-law with a photon spectral index of ~ 2.1 , indicating that the RXTE energy band might be located right at the intersection of the synchrotron and the high-energy emission components. No significant flux or spectral variability at X-ray energies was detected, though there seems to be a trend of very modest brightening in tandem with the optical flux. The first 4 VLBA epochs indicate a rather smooth jet with only very moderate internal structure. After decomposition in Gaussian components, evidence for superluminal motion ($11.0 \pm 4.7 h^{-1} c$) was found in only one out of 6 jet components. The radial radio brightness profile suggests a magnetic field decay $\propto r^{-1}$ and, thus, a predominantly perpendicular magnetic field orientation.

Publications:

- Böttcher, M., et al., 2004, *BAAS*, 36, 3.4.10
- Harvey, J., Böttcher, & Joshi, M., 2005, *BAAS*, in press (205th AAS Meeting)
- Böttcher, M., et al., 2005, *ApJ*, in preparation